

AMENDMENTS TO THE CLAIMS

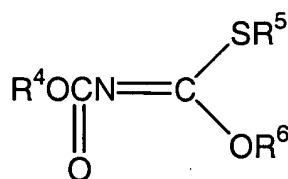
This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-8. (canceled).

9. (withdrawn): A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



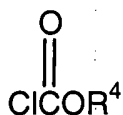
in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing an intermediate represented by the following general formula (8); and

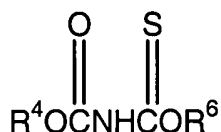
preparing the isothiocyanatoformic acid ester derivative from the intermediate:

ZNCS
General formula (5)

R^6OH
General formula (6)



General formula (7)



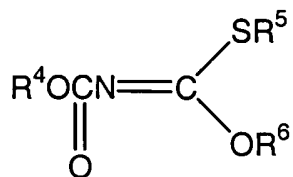
General formula (8)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom.

10. (canceled).

11. (withdrawn): A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)

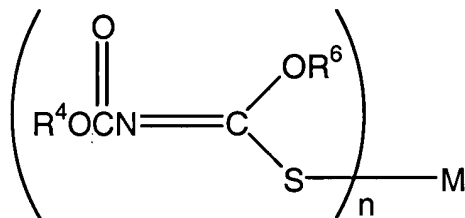


in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group;

and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

preparing an intermediate represented by the following general formula (10); and

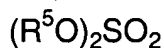
reacting the intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:



General formula (10)



General formula (11)

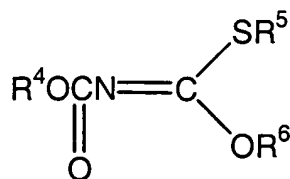


General formula (12)

wherein, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO₃Ar, and Ar represents a substituted or non-substituted aryl group.

12. (currently amended): A method of preparing an isothiocyanatoformic acid ester product representative by the following formula (2):

Formula (2)



in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, the method comprising:

preparing a first intermediate represented by the following formula (8) by ~~adding~~ mixing an isothiocyanic acid salt represented by the following formula (5)[[,]] and a hydroxy derivative represented by the following formula (6), and ~~further~~ then adding a chloroformic acid derivative represented by the following formula (7);

preparing a second intermediate represented by the following formula (10) from the first intermediate and a compound represented by the following formula (9); and

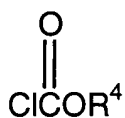
reacting the second intermediate with an alkylating agent represented by one of the following formulas (11) and (12) for preparing the isothiocyanatoformic acid ester product:



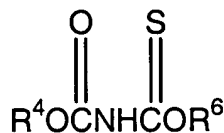
Formula (5)



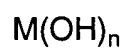
Formula (6)



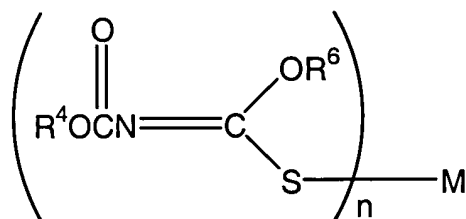
Formula (7)



Formula (8)



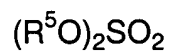
Formula (9)



Formula (10)



Formula (11)



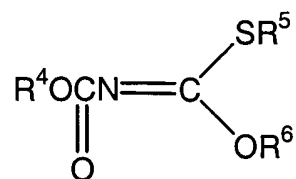
Formula (12)

wherein, in the formula (5), Z represents a sodium atom or a potassium atom, in the formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, n represents an integer selected from 1 to 3, and, in the formula (11), X represents a halogen atom or SO₃Ar, and Ar represents a substituted or non-substituted aryl group, and

wherein the second intermediate represented by the formula (10) is obtained as crystals.

13. (withdrawn): A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)

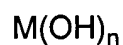
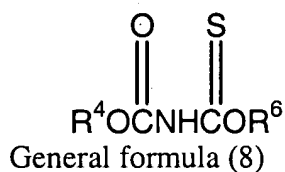


in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

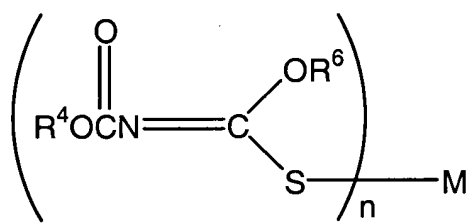
preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:



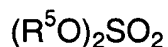
General formula (9)



General formula (10)



General formula (11)

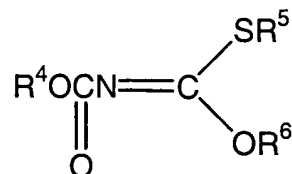


General formula (12)

wherein, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO₃Ar, and Ar represents a substituted or non-substituted aryl group.

14. (withdrawn): A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

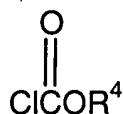
adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate; and

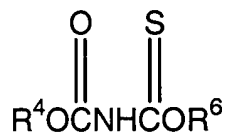
reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

$ZNCS$
General formula (5)

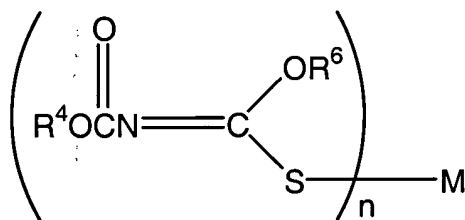
R^6OH
General formula (6)



General formula (7)



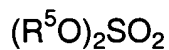
General formula (8)



General formula (10)



General formula (11)

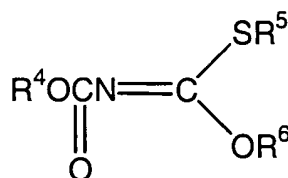


General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

15. (withdrawn): A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate; and

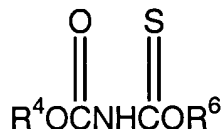
reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

$ZNCS$
General formula (5)

R^6OH
General formula (6)

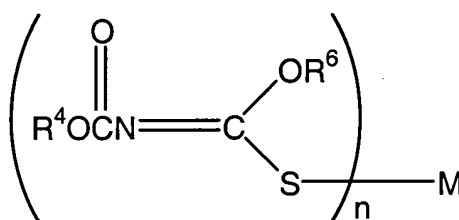


General formula (7)



General formula (8)

$M(OH)_n$



General formula (9)

General formula (10)

R^5X

General formula (11)

$(R^5O)_2SO_2$

General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

16. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by formula (8), the intermediate represented by the formula (8) is

prepared by dissolving in a reaction solvent the isothiocyanic acid salt represented by the formula (5) and the hydroxy derivative represented by the formula (6), and then adding dropwise the chloroformic acid derivative represented by the formula (7), thus causing a reaction.

17. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), an amount (mol) of the isothiocyanic acid salt represented by the formula (5) is 1 to 5 times an amount of the hydroxy derivative represented by the formula (6).

18. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), an amount (mol) of the isothiocyanic acid salt represented by the formula (5) is 1 to 3 times an amount of the hydroxy derivative represented by the formula (6).

19. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), an amount (mol) of the chloroformic acid derivative represented by the formula (7) is 0.5 to 3 times an amount of the hydroxy derivative represented by the formula (6).

20. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), an amount (mol) of the chloroformic acid derivative represented by the formula (7) is 0.5 to 1.5 times an amount of the hydroxy derivative represented by the formula (6).

21. (previously presented): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), a solvent selected from the group consisting of acetonitrile, acetone, and tetrahydrofuran is used as a reaction solvent.

22. (currently amended): The method of claim 12, wherein in preparing the first intermediate represented by the formula (8), a reaction temperature thereof is in a range from -25 to 40°C.

23. (previously presented): The method of claim 12, wherein in preparing the second intermediate represented by the formula (10), an amount (mol) of the compound represented by the formula (9) is 1 to 5 times an amount of the first intermediate represented by the formula (8).

24. (previously presented): The method of claim 12, wherein in preparing the second intermediate represented by the formula (10), a solvent selected from the group consisting of water, methanol, ethanol, acetonitrile, acetone, and tetrahydrofuran is used as a reaction solvent.

25. (previously presented): The method of claim 12, wherein in reacting the second intermediate represented by the formula (10) with the alkylating agent represented by one of the formulas (11) and (12), suspending the intermediate represented by the formula (10) in a reaction solvent and then adding dropwise the alkylating agent represented by the formulas (11) or (12) are included in order to obtain the isothiocyanatoformic acid ester represented by the formula (2).

26. (previously presented): The method of claim 12, wherein in reacting the second intermediate represented by the formula (10) with the alkylating agent represented by one of the formulas (11) and (12), an amount (mol) of at least one of the alkylating agent represented by

one of the formulas (11) and (12) is 1 to 3 times an amount of the second intermediate represented by the formula (10).

27. (previously presented): The method of claim 12, wherein in reacting the second intermediate represented by the formula (10) with the alkylating agent represented by one of the formulas (11) and (12), an amount (mol) of at least one of the alkylating agent represented by one of the formulas (11) and (12) is 1 to 1.5 times an amount of the second intermediate represented by the formula (10).

28. (previously presented): The method of claim 12, wherein in reacting the second intermediate represented by the formula (10) with the alkylating agent represented by one of the formulas (11) and (12), a solvent selected from the group consisting of acetonitrile, acetone, dimethylformamide, dimethylacetamide, tetrahydrofuran, dimethyl sulfoxide, and alcohol is used as a reaction solvent.